

## CLAIMS

What is claimed is:

1. A method of controlling combustion in an internal combustion engine comprising the steps of:

transferring a first quantity of fuel and first post-combustion gases to a combustion chamber through an exhaust port to raise a temperature of said first quantity of fuel while an exhaust port pressure in said exhaust port is higher than a first combustion chamber pressure;

transferring pre-combustion gases into said combustion chamber at said first combustion chamber pressure;

mixing said first quantity of fuel, said pre-combustion gases, and said first post-combustion gases to form a substantially homogenous mixture;

substantially sealing said exhaust port from said combustion chamber;

adding heat to said combustion chamber by raising said first combustion chamber pressure to a second combustion chamber pressure substantially higher than said first combustion chamber pressure;

transferring a second quantity of fuel to said combustion chamber;

substantially combusting said first and second quantities of fuel with said heat to form second post-combustion gases;

exhausting said second post-combustion gases through said exhaust port.

2. The method of controlling combustion in an internal combustion engine of claim 1, wherein the step of transferring said first quantity of fuel and first post-combustion gases to said combustion chamber comprises further the step of injecting said first quantity of fuel into said exhaust port or exhaust manifold.

3. The method of controlling combustion in an internal combustion engine of claim 1, wherein the step of injecting said second quantity of fuel further comprises the step of shaping a rate of said fuel injection.

4. The method of controlling combustion in an internal combustion engine of claim 1, wherein the step of substantially combusting said first and second quantities of fuel with said heat to form second post-combustion gases comprises further the steps of:

injecting a third quantity of fuel into said combustion chamber;  
substantially combusting said third quantity of fuel with said heat.

5. The method of controlling combustion in an internal combustion engine of claim 4, wherein the step of injecting said third quantity of fuel comprises further the step of shaping a rate of said fuel injection.